

# INSTRUMENTS & SENSORS

Innovation and research  
for improved measurement

**DANIELI** AUTOMATION

## Instruments & Sensors

- > Dimensional control
- > Surface quality control
- > Process control
- > Artificial-vision process control



Since the beginning of its activity in 1969, Danieli Automation has developed special sensors for steelworks applications. Our products are defined by technological solutions which allow their utilization in the extreme conditions typical of steel industry. Our design and production have always been focused on:

- > the use of environment compatible elements, adopting the state of the art solution for semiconductors
- > totally static solutions representing the absolute innovation for sensors in the 60s.

This strategy, supported by the continuous research and development over the years, allowed us to make special devices meeting the demand of process and steel plants available to customers and market, as well as systems through which the sensor becomes the innovative part for the continuous check of the final product quality.

### Skills

- > System design based on electromagnetic fields, radiation, infrared, laser light and X-rays
- > Finite elements modelling of multi-discipline systems
- > Algorithm development and optimization
- > Design of analogue and digital electronics circuits (FPGA, microprocessors, DSP, optoelectronics)
- > Sizing of power electromagnetic systems
- > Integrated systems with interfaces to automation systems
- > Metallurgy

### Research & Development

- > Concept design
- > Modelling
- > Cooperation with universities for innovative solutions
- > Algorithm development
- > Laboratory testing

### Technical Department

- > Mechanical engineering
- > Electrical engineering
- > System design
- > Software design and development
- > Product/system customization
- > Integration with other control systems

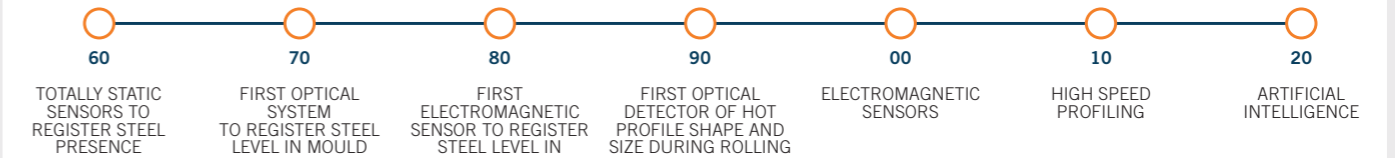
### Production and assistance

- > System test design
- > Functional test
- > System validation and tuning
- > Specialized personnel for assistance during erection and start up
- > Remote assistance
- > Spare parts service

### Return of investment

- > Certified quality
- > Production within tolerance
- > Quicker system adaptation
- > Improved controls
- > On-line measurements without the need of sampling

### MAIN TECHNOLOGICAL EVENTS



### TECHNOLOGY



OPTICAL



LASER



ELECTROMAGNETIC



X-RAY



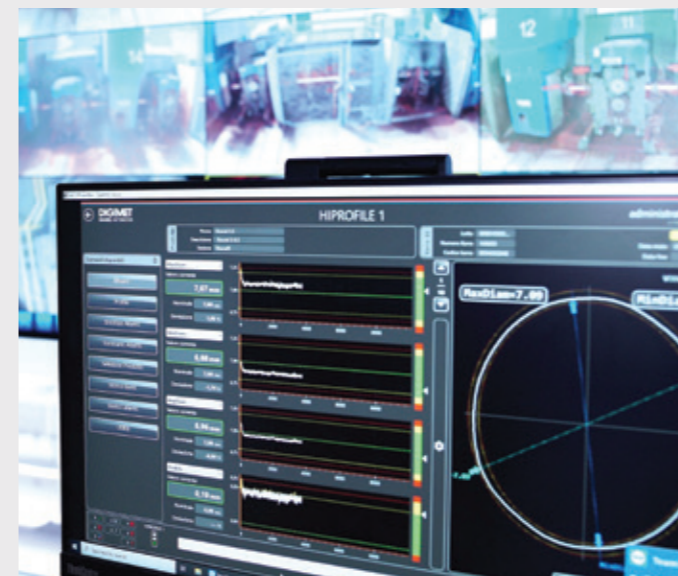
INFRARED

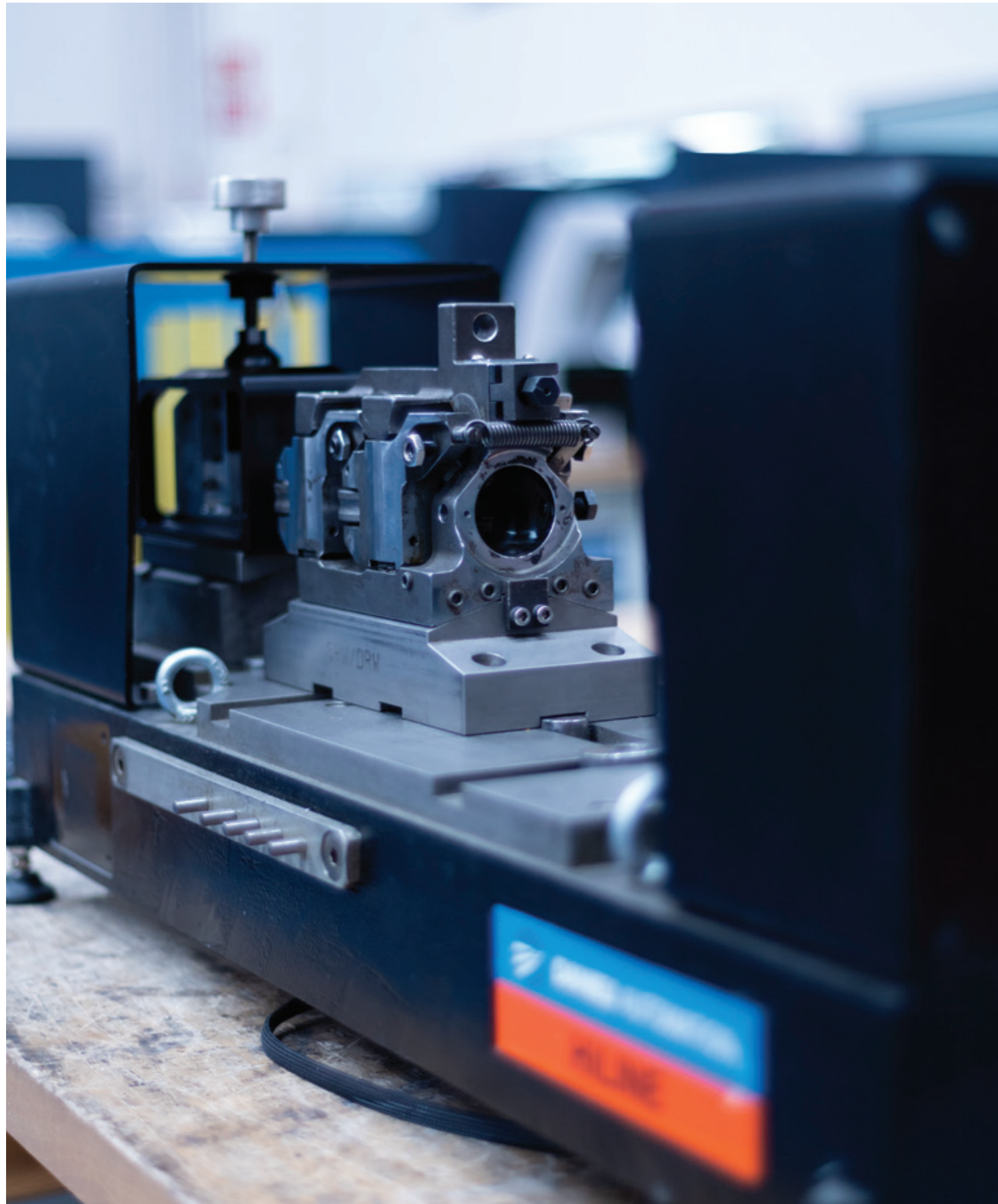


IMAGE PROCESSING

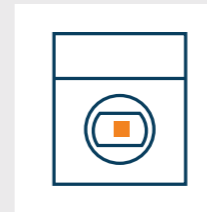


AI

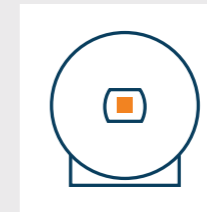




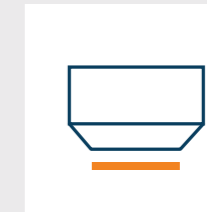
**DIMENSIONAL CONTROL**



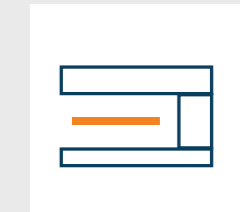
HiPROFILE



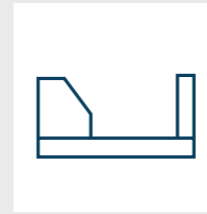
HiPROFILE LITE



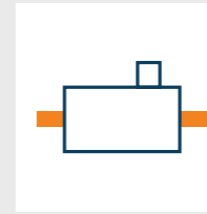
HiWIDTH



HiTHIX



HiLINE IFB

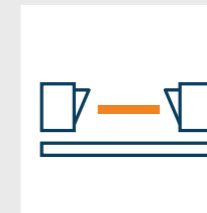


HiSECTION

**SURFACE QUALITY CONTROL**



INTELLIGRIND 3D

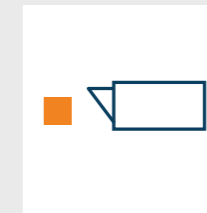


HiPROFILE CAST

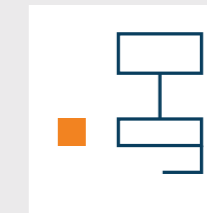
**PROCESS CONTROL**



SM3210 / SM3120



ID2000



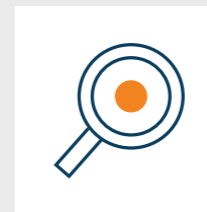
ID2250 FIBER OPTIC



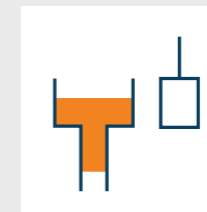
ID6000



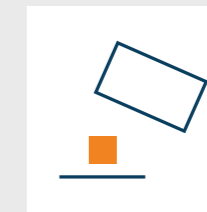
ID6000 F



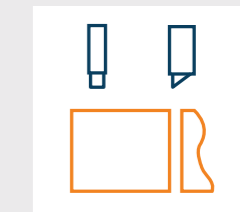
MD2000



HiLEVEL



HiCORNER

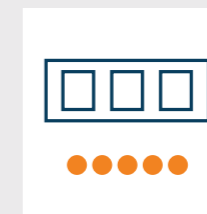


Q-CROP

**ARTIFICIAL VISION PROCESS CONTROL**



Q-VID SPOOL



Q-VID DANCOUNTER



Q-VID TENSION

**HiPROFILE®**  
Laser Profile Gauge

- L Bars, beams & profiles
- ✦ Laser triangulation
- 5 - 1200 mm



**PURPOSE** On-line non-contact profile measurement

**BENEFITS** Improve product quality and production yield

**HiPROFILE LITE®**  
Laser Profile Gauge

- L Bars, rebars
- ✦ Laser triangulation
- 4 - 70 mm



**PURPOSE** On-line contactless bar measurement

**BENEFITS** Improve product quality and production yield

**HiWIDTH®**  
Stereoscopic Width Gauge

- F Strips, plates
- ✦ Laser triangulation
- 600 - 5000 mm (width)  
3 - 300 mm (thickness)



**PURPOSE** On-line contactless flat products measurement

**BENEFITS** Improve product quality and production yield

**HiTHIX®**  
X-ray Thickness Gauge

- F Strips, plates
- ☼ X-ray system
- 0.1 - 6000 µm (thickness)  
up to 2200 mm (width)



**PURPOSE** On-line contactless flat products measurement of thickness

**BENEFITS** Improve product quality and production yield

**HiLINE IFB®**  
Roller Guide Calibration and Alignment System

- L Long products
- 👁 Optical system
- 0.05 mm (accuracy)

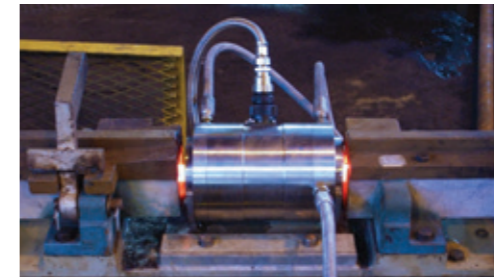


**PURPOSE** Set-up and alignment of the roller guide in a workshop

**BENEFITS** Quality certification of product and improved production yield

**HiSECTION®**  
Section Gauge System

- L Hot-rolled rounds & rebars
- ⊖ Eddy current
- 5 - 110 mm



**PURPOSE** On-line measurement of cross sectional area of hot rolled bars

**BENEFITS** Improve product tolerances and enhanced plant efficiency



> SURFACE QUALITY CONTROL

**INTELLIGRIND**  
3D Automatic surface defects detection & mapping

- F** Slabs, plates and strips
- 📷** Image processing
- 1 mm dia

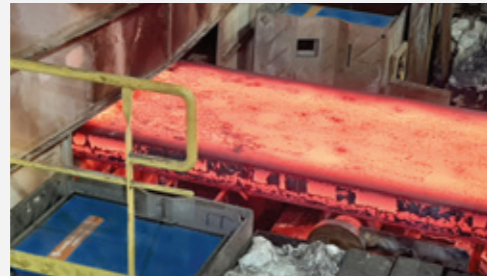


**PURPOSE** Hot flat automatic 3D defect detection system, designed for Slab caster, Plate mill, Hot strip mill.

**BENEFITS** Reduces amount of grinding operations, with higher productivity and safety increase. Constant quality control feedback to caster

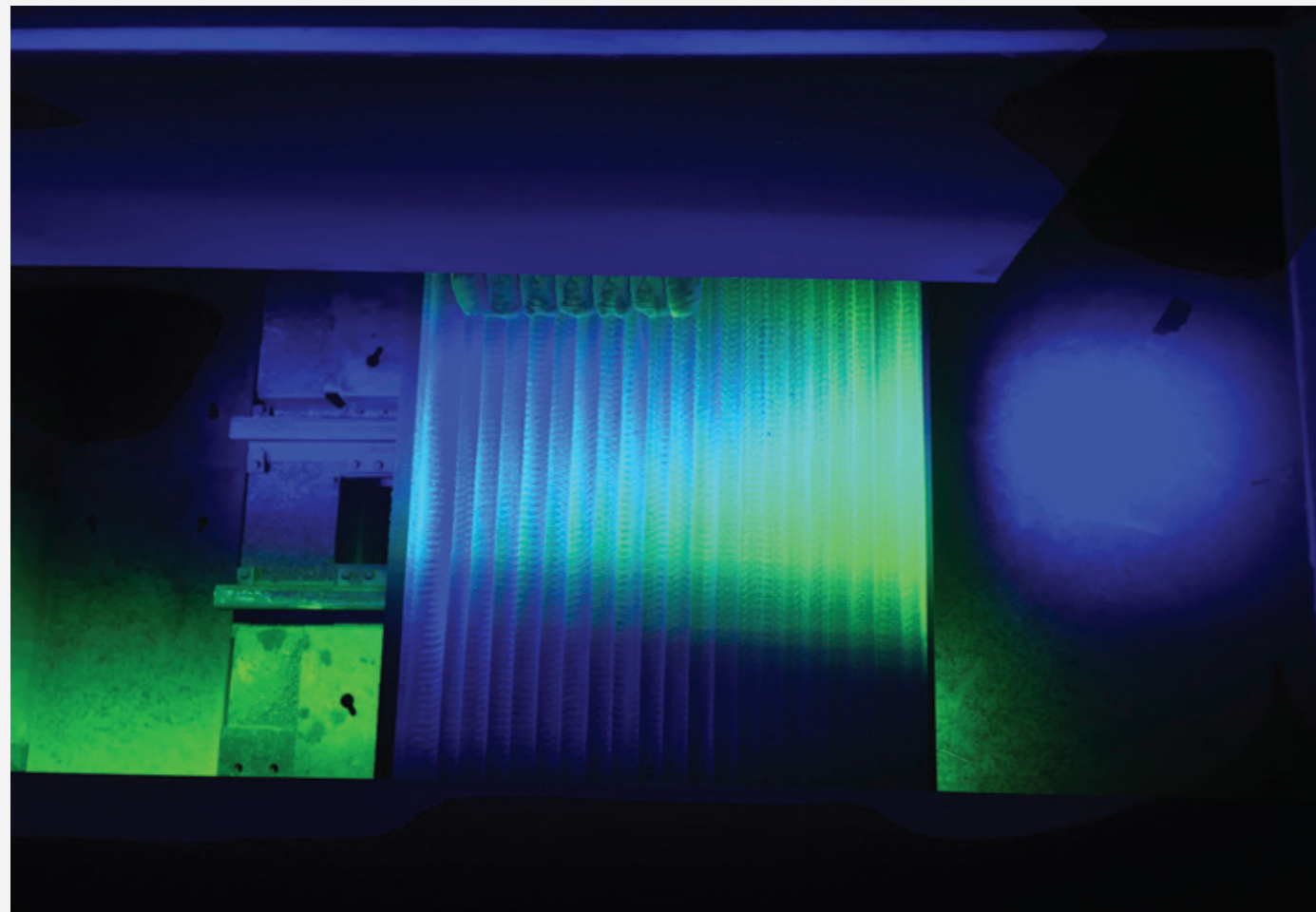
**HiPROFILE CAST**  
Non-contact face bulging measurement

- S** Steelmaking area
- 🔦** Laser triangulation
- 20-230 mm height  
1000-2500 mm length




**PURPOSE** On-line non-contact width and narrow face bulging measurement during the casting process

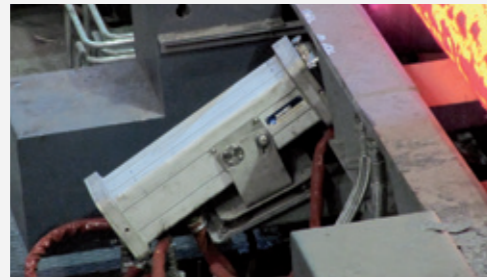
**BENEFITS** Improve product quality and production yield





**SM3210**  
Infrared Speed Meters

- L** **F** Long & flat products
-  Infrared
- 0.05 %



**PURPOSE** Low and high speed measurement of hot and cold material in billet/bloom/slab casters

**BENEFITS** Increased plant yield and results thanks to accurate speed measurement

**SM3120**  
Infrared Speed Meters


- L** Long products
-  Infrared
- < 0.2 %



**PURPOSE** Low and high speed measurement of hot and cold material in wire and section mills

**BENEFITS** Increased plant yield and results thanks to accurate speed measurement

**ID2000**  
Hot Metal Detectors


- L** **F** Long & flat products
-  Infrared
- ≥ 450-650 °C



**PURPOSE** Optical detectors designed to detect the presence of infrared emitting bodies in hot wire, rod, bar and section mills or in hot plate and hot strip mills.

**BENEFITS** Specifically designed for the steel industry, the ID2000 series can be installed in harsh environmental conditions

**ID2250 FIBER OPTIC**  
Hot Metal Detectors  
(Fiber-optic sensing head)


- L** **F** Long & flat products
-  Infrared
- ≥ 450-650 °C



**PURPOSE** Same as above. ID2250 models (with fiber optic cable) available if limited space or close distance needed

**BENEFITS** Designed to be used in working conditions with severe space limitations, high temperatures, dust and water/oil mist

**ID6000**  
Loop Scanner

- L** **F** Long & flat products
-  Infrared
- ≥ 450-650 °C

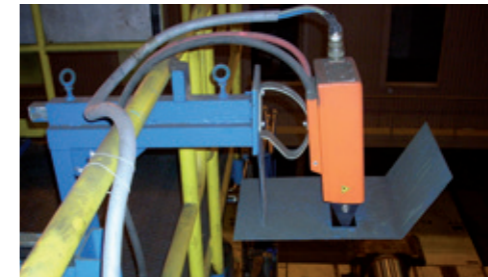


**PURPOSE** ID6000 devices are designed to detect the position of infrared emitting bodies and control the loop in Hot Rolling Mills

**BENEFITS** Increased plant yield and results thanks to accurate measurements of the loop positions

**ID6F10**  
Edge position sensor  
for Flat Products


- F** Flat products
-  Infrared
- ≥ 450-700 °C



**PURPOSE** Infrared optical detector for measurement of material offset from the center-line and width of flat rolled product

**BENEFITS** Specially designed to be installed between mill stands to control and stabilize the rolling process

**MD2000**  
Hot and Cold Magnetic  
Metal Detectors


- L** Long products
-  Electromagnetic
- 0-700 °C

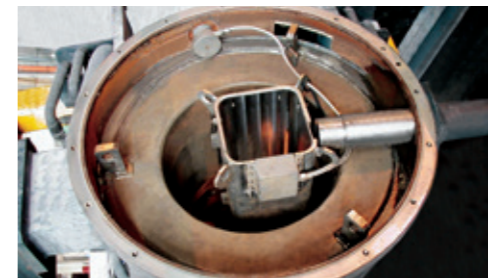


**PURPOSE** Hot and cold metal detection presence by means of magnetic fields

**BENEFITS** Ideal solution for metal detection in environment where infrared detection is not reliable due to vibrations, water or steam presence

**HiLEVEL**  
Mould Level Measurement


- S** Steelmaking Area
-  Electromagnetic
- 130 mm (220 mm extended)



**PURPOSE** Detection of steel level in the mould or casting powder level measurement in conjunction with a radioactive level sensor

**BENEFITS** Fast response time and high measurement accuracy, with very low maintenance requirements

**HiCORNER**  
Corner position detection

- L** Long products
-  Laser triangulation
- 25-250 mm



**PURPOSE** On-line non-contact corner position detection of square products during the grinding process

**BENEFITS** Improved edge grinding quality due to accurate grinder guide by precise corner detection

**QCROP**  
Crop Shear  
Optimization System

- F** Flat products
-  Optical
- ≥ 450-700 °C



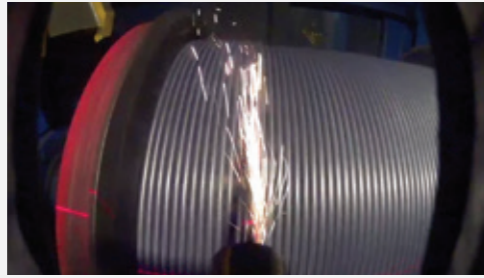
**PURPOSE** System to reconstruct head and tail slab shape, determining the two optimized cut lengths, measuring the bar without any physical contact

**BENEFITS** Improved quality of rolled strips and bars, with less production stops due to cobbles. Increased plant yield thanks to shear scrap reduction

## > ARTIFICIAL VISION-BASED PROCESS CONTROL

### Q-VID SPOOL Artificial-Vision based measurement system

- L Long products
- AI
- 100 fps frequency



**PURPOSE** Groundbreaking instrumentation vision system dedicated to measure the angle of the material at the exit of the spooler system

**BENEFITS** Feeding the automation control with the indication of the angle to fine tuning the distributor course, it permits to optimally displace the rolled wires.

### Q-VID DANCOUNTER Bars counting system

- L Bars
- AI
- 99.9 % accuracy



**PURPOSE** System designed to count bars in an efficient and highly precise way using artificial intelligence

**BENEFITS** Improved plant efficiency, reduced time losses and production stops, as well as encumbrances elimination for in-line installations.

### Q-VID TENSION CONTROL Material tension sensor

- L Long products
- AI
- 6 - 50 mm



**PURPOSE** System designed to evaluate material tension during the rolling process by vibration analysis

**BENEFITS** Overcome loop exploiting to control the process by analyzing the product behaviour during rolling. Early cobbles detection in case of erratic rolling tension.



## HEADQUARTERS



### DANIELI

Via Nazionale, 41  
33042 Buttrio (UD) Italy  
Phone (39) 0432 195 8111  
Fax (39) 0432 195 82 89  
www.danieli.com  
info@danieli.com



### DANIELI AUTOMATION

Via Bonaldo Stringher, 4  
33042 Buttrio (UD) Italy  
Phone (39) 0432 518 111  
Fax (39) 0432 673 177  
www.dca.it  
info@dca.it

## DANIELI WORLDWIDE

### ARGENTINA

Yerba Buena T4107GRS,  
Tucumán  
Tel. (54) 9351 5514390  
service.argentina@danieli.com

### CHINA

Room 2580, 25th floor  
37 Maizidian street  
Chaoyang District, Beijing  
Phone (86) 0512 52267086  
infodia@danieli.com

### FRANCE

Tours Mercuriales  
40 Rue Jean Jaurès  
F-93176 Bagnolet Cedex  
Tel. (33) 1.49722269  
info@danieli-rotelec.fr

### INDONESIA

Office 8 Building, 17th Floor SCBD Lot  
28 Jl. Jenderal Sudirman Kav. 52-53  
12190 Jakarta  
Tel. (62) 21.29333750  
service.indonesia@danieli.com

### KSA

Silver Tower 6th floor  
P.O. Box 4867  
Al-Khobar 31952  
Tel. (966) 3.8993145  
info@ksa.danieli.com

### SWEDEN

Nya Ågatan, 23  
SE-77782 Smedjebacken  
Tel. (46) 240.668500  
mh@morgardshammar.se

### THE NETHERLANDS

Rooswijkweg 291, 1951  
ME Velsen-Noord  
Tel. (31) (0) 251.500500  
info@danieli-corus.com

### UKRAINE

Glinky Street 2, Office 301  
49000 Dnipropetrovs'k  
Tel. (380) 56.7904301  
info@ukraine.danieli.com

### USA

114 Chesser Crane Road  
Chelsea, AL 35043  
Phone (1) 205.6787451  
info@usa.danieli.com

### AUSTRIA

Max Planck Strasse, 5  
A - 9100 Völkermarkt  
Tel. (43) 4232.51440.6101  
info@austria.danieli.com

### CROATIA

Vinez 601,  
Labin 52220  
Tel. (385) 52 884 130  
info.hr@systec.danieli.com

### GERMANY

Schifferstrasse 166  
D-47059 Duisburg  
Tel. (49) 203.98567000  
info@germany.danieli.com

### JAPAN

42F, Yokohama Landmark Tower  
2-2-1, Minatomirai, Nishi-ku  
Yokohama-City 20-8142  
Tel. (81) 45.651.7077  
info@japan.danieli.com

### MEXICO

C. Padre Mier 1545, Of. 502,  
Obispado, 64040 Monterrey,  
Nuevo Leon  
+52 81.83781056  
info@mexico.danieli.com

### TAIWAN

26F-1, No. 31  
Hai-Bian Road  
Kaohsiung City, Taiwan 802  
Tel. (886) 7.3358655  
info@taiwan.danieli.com

### TURKEY

1. OSB Istiklal Mahallesi  
1. Cadde No. 15  
Beykoy - Duzce  
Tel. (90) 3805537110  
info@turkey.danieli.com

### UNITED KINGDOM

4 Ignite, Magna Way  
Rotherham S60 1FD  
Tel. (44) 1709.724300  
info@uk.danieli.com

### VIETNAM

Lot A4b Industrial Park  
Tan Thuan EPZ (E-Office Park)  
Tan Thuan Dong Ward, District 7  
Ho Chi Minh City  
Tel. (84) 28.37929400  
info@vietnam.danieli.com

### BRAZIL

Rod. Raimundo Antunes Soares, 2289  
CEP 18115-120 Votorantim São Paulo  
Tel. (55) 11.39953150  
info@brazil.danieli.com

### EGYPT

Millennium Building, No.69, Sect 1  
5th Settlement 11835 New Cairo  
Tel. (202) 2.8133698  
info@egypt.danieli.com

### INDIA

Technopolis Building  
Plot 4, Block - BP, 5th Floor  
Wing - B, Sector - V, Salt Lake  
700 091 Kolkata - West Bengal  
Phone (91) 33.39847777  
info@india.danieli.com

### KOREA

# 602 6th Fl., Yeondang Bldg., 439  
Teheran-Ro, Gangnam-Gu,  
06158 Seoul  
Tel. (82) 2.5626622  
info@korea.danieli.com

### SPAIN

Poligono Sondikalde  
Calle Portu Bidea, 2  
48150 Sondika - Vizcaya  
Tel. (34) 94.4872800  
info@spain.danieli.com

### THAILAND

Land Plot N. K11  
The Eastern Seaboard Ind. Estate  
Tambol Pluakdaeng, Amphur  
Pluakdaeng, 21140 Rayong  
Tel. (66) 38.929000  
info@thailand.danieli.com

### UAE

Late Ahmed Masood building  
Office 1102, 11th floor Nadja Street,  
Abu Dhabi  
Tel. (971) 0 6749 619  
service.uae@danieli.com

### USA

600 Cranberry Woods Drive  
Suite 200  
Cranberry Township, PA 16066  
Tel. (1) 724.7785400  
info@usa.danieli.com